

**Amendment and Response**

Applicant: Debargha Mukherjee et al.

Serial No.: 10/724,284

Filed: Nov. 26, 2003

Docket No.: 200310816-1

Title: METHOD AND APPARATUS FOR APPLYING RECEIVING ATTRIBUTES USING CONSTRAINTS

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**IN THE CLAIMS**

Please amend the claims as follows.

1-10. (Canceled)

11. (Currently Amended): A machine-implemented method, comprising:

- receiving a scalable encoded bitstream comprising scalable encoded media data and values of non-media-type-specific scalability attribute variables defining different adaptation points of the scalable encoded media data;
- obtaining receiving attributes for a destination of an outbound version of the scalable encoded bitstream, wherein ones of the receiving attributes define explicit constraints on the outbound version of the scalable encoded bitstream in terms of respective functions of ones of the scalability attribute variables;
- determining values of adaptation measures from respective evaluations of the functions based on the values of the ones of the scalability attribute variables;
- ascertaining a set of one or more candidate ones of the adaptation points of based on imposition of the constraints on the determined values of the adaptation measures;
- selecting an adaptation point from the set of candidate adaptation points without regard to the scalable encoded media data; and
- transcoding the scalable bit stream in accordance with the selected adaptation point to produce the outbound version of the scalable encoded bitstream.

12. (Previously Presented): The method of claim 11, wherein the determining comprises determining the value of at least one of the adaptation measures based at least in part on a multivariate function defined by a respective one of the receiving attributes and comprising a linear combination of products of univariate functions of ones of the scalability attribute variables.

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13. (Previously Presented): The method of claim 12, wherein the ascertaining comprises comparing the at least one adaptation measure to at least one constraint defined by a respective one of the receiving attributes.

14. (Previously Presented): The method of claim 11, wherein the ascertaining comprises comparing ones of the adaptation measures to respective limit constraints defined by respective ones of the receiving attributes.

15. (Previously Presented): The method of claim 11, wherein the selecting comprises comparing ones of the adaptation measures to optimization constraints defined by respective ones of the receiving attributes.

16. (Previously Presented): The method of claim 13, wherein the products comprise product terms and the determining comprises evaluating the multivariate function based on ones of the receiving attributes specifying at least one of:

- a number of product terms in the linear combination;
- a number of elements in each product term;
- attribute codes for attributes in each product term;
- function codes for the univariate functions of the attribute values; and
- multipliers for the linear combination.

17. (Previously Presented): The method of claim 14, wherein the ascertaining comprises comparing ones of the adaptation measures to ones of the limit constraints specifying for at least one of one of the adaptation measures at least one of a maximum value and a minimum value supportable by the destination.

18. (Previously Presented): The method of claim 15, wherein the selecting comprises selecting the adaptation point in accordance with at least one of the optimization constraints specifying at least one of a maximization and a minimization of a respective one of the adaptation measures.

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19. (Previously Presented): The method of claim 11, wherein the determining comprises determining at least one of the adaptation measures based at least in part on an evaluation of a stack function comprising operators, and variables corresponding to ones of the scalability attributes.

20-32. (Canceled)

33. (Currently Amended): A transcoder, comprising:

an input that receives a scalable encoded bitstream comprising scalable encoded media data and a resource description comprising values of non-media-type-specific scalability attribute variables defining different adaptation points of the scalable encoded media data, wherein the input additionally receives receiving attributes for a destination of an outbound version of the scalable encoded bitstream, wherein ones of the receiving attributes define explicit constraints on the outbound version of the scalable encoded bitstream in terms of respective functions of ones of the scalability attribute variables;

an optimizer that determines values of adaptation measures from respective evaluations of the functions based on the values of the ones of the scalability attribute variables, ascertains a set of one or more candidate ones of the adaptation points of based on imposition of the constraints on the determined values of the adaptation measures, and selects an adaptation point from the set of candidate adaptation points without regard to the scalable encoded media data; and

a resource adaptation engine that transcodes the scalable bit stream in accordance with the selected adaptation point to produce the outbound version of the scalable encoded bitstream.

34. (Currently Amended): A computer system, comprising:

a memory; and

a transcoder that performs operations comprising

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receiving a scalable encoded bitstream comprising scalable encoded media data and values of non-media-type-specific scalability attribute variables defining different adaptation points of the scalable encoded media data,

obtaining receiving attributes for a destination of an outbound version of the scalable encoded bitstream, wherein ones of the receiving attributes define explicit constraints on the outbound version of the scalable encoded bitstream in terms of respective functions of ones of the scalability attribute variables;

determining values of adaptation measures from respective evaluations of the functions based on the values of the ones of the scalability attribute variables;

ascertaining a set of one or more candidate ones of the adaptation points of based on imposition of the constraints on the determined values of the adaptation measures;

selecting an adaptation point from the set of candidate adaptation points without regard to the scalable encoded media data, and

transcoding the scalable bit stream in accordance with the selected adaptation point to produce a scaled version of the scalable encoded bitstream.

35 and 36. (canceled)

37. (Previously Presented): The method of claim 11, wherein the scalable encoded bitstream additionally comprises description metadata specifying a hierarchical model of the bitstream, and the transcoding further comprises adapting the description metadata to represent the structure of the outbound version of the scalable encoded bitstream.

38. (Previously Presented): The method of claim 11, wherein the scalable encoded bitstream specifies combination variables in terms of respective ordered lists of ones of numeric constants, variables, arguments, and operators; and further comprising evaluating

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each of the combination variables, wherein the evaluating comprising pushing the respective ordered list onto a respective expression stack.

39. (Previously Presented): The method of claim 38, wherein the pushing comprises pushing each constant into the respective expression stack, and the pushing of each constant comprises pushing a real numeric element corresponding to the constant into the respective expression stack.

40. (Previously Presented): The method of claim 38, wherein the pushing comprises pushing each variable into the respective expression stack, and the pushing of each variable comprises determining a numeric value of the variable for a set of adaptation points and pushing the determining numeric value into the respective expression stack.

41. (Previously Presented): The method of claim 38, wherein the pushing comprises pushing one or more unary operators into the respective expression stack, and  
in response to pushing each unary operator into the respective expression stack, popping the unary operator and a successive top numeric stack element out of the respective expression stack, determining a result from the popped unary operator and numeric stack element, and pushing the result into the respective expression stack.

42. (Previously Presented): The method of claim 38, wherein the pushing comprises pushing one or more binary operators in the respective expression stack, and  
in response to pushing each binary operator into the respective expression stack, popping the binary operator and two successive top numeric stack elements out of the respective expression stack, determining a result from the popped binary operator and the two numeric stack elements, and pushing the result into the respective expression stack.

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43. (Previously Presented): The method of claim 38, further comprising calling each of the combination variables specifying a number of arguments, and in response to each calling of a respective one of the combination variables, serially popping the specified number of top elements from the respective expression stack, and determining a value of the combination variable from the popped elements.

44. (Previously Presented): The method of claim 11, wherein the receiving comprises receiving the scalable encoded bitstream from at least one remote network node, the obtaining comprises receiving the receiving attributes from at least one remote network node, and the scalable encoded bitstream and the receiving attributes are received from different from respective network nodes.